

What is claimed is:

1. An apparatus for use in performing an angioplasty procedure at the site of a stenosis in the vasculature of a patient which comprises:

a catheter;

5 an inflatable balloon mounted on said catheter, said inflatable balloon having a proximal end and a distal end and defining an axis, said balloon being insertable into the vasculature of a patient and positioned therein for movement between a deflated configuration and an inflated configuration;

10 an elongated resilient base member having a first end and a second end, with the first end of said base member affixed to said catheter at a location proximal to the proximal end of said balloon and with said second end of said base member affixed to said catheter at a location distal to the distal end of said balloon for movement of said
15 base member with said balloon; and

a plurality of blade segments attached to said base member for movement therewith, with a portion of each said blade segment being juxtaposed with a portion of at least one other said blade segment and being axially off-set therefrom to allow relative movement therebetween
20 during a movement of said balloon from said deflated configuration into said inflated configuration to embed at least one of said plurality of blade segments into the stenosis.

2. An apparatus as recited in claim 1 wherein each said blade segment is elongated defining a blade axis for each said blade segment, and
25 each said blade segment is attached to said base member with its blade axis aligned substantially parallel to said balloon axis.

3. An apparatus as recited in claim 1 wherein said base member is made of a polyurethane material.

4. An apparatus as recited in claim 1 wherein said plurality of blade segments mounted on said base member are a blade unit and further wherein said apparatus comprises a plurality of said blade units.

5. An apparatus as recited in claim 1 wherein each said blade segment is made of a material selected from the group consisting of Martensitic 440; Martensitic 420; cobalt/chrome steel; a precipitation hardening steel; and work hardened 304 or 316 stainless steels.

6. An apparatus as recited in claim 1 wherein said apparatus comprises at least three said blade segments.

10 7. An apparatus as recited in claim 1 wherein said base member is bonded to said catheter.

8. An apparatus for use in performing an angioplasty procedure at the site of a stenosis in the vasculature of a patient, said apparatus comprising:

a catheter;

5 an inflatable balloon mounted on said catheter and being insertable into the vasculature of a patient, said inflatable balloon having a proximal end and a distal end and defining an axis;

first and second bands positioned on said catheter tube with said band positioned distal to said balloon and said second band positioned proximal to said balloon;

10 a resilient member attached to said first band and said second band; and

a plurality of blade segments mounted on said resilient member, with a portion of each said blade segment being juxtaposed with a portion of at least one other said blade segment and being axially offset therefrom to allow relative movement therebetween during a movement of said balloon from a deflated configuration into an inflated configuration to embed at least one of said plurality of blade segments into the stenosis.

20 9. An apparatus as recited in claim 8 wherein each said blade segment is elongated defining a blade axis for each said blade segment, and each said blade segment is attached to said member with its blade axis aligned substantially parallel to said balloon axis.

10. An apparatus as recited in claim 8 wherein said resilient member is made of a polyurethane material.

11. An apparatus as recited in claim 8 wherein said plurality of blade segments mounted on said resilient member are a blade unit and further wherein said apparatus comprises a plurality of said blade units.

12. An apparatus as recited in claim 8 wherein each said blade segment is made of stainless steel.

13. An apparatus as recited in claim 8 wherein said apparatus comprises at least three said blade segments.

5 14. An apparatus as recited in claim 8 wherein said plurality of blade segments mounted on said resilient member are a blade unit and further wherein said apparatus comprises four said blade units.

15 15. An apparatus as recited in claim 8 wherein said first band and said second band are bonded to said catheter.

10 16. A method for incising a stenosis in the vasculature of a patient, said method comprising:

 inserting a catheter having an inflatable balloon that defines an axis with a resilient base member disposed on said balloon, said catheter having a plurality of blade segments attached to said base member with a portion of each said blade segment being juxtaposed with a portion of at least one other said blade segment and being axially off-set therefrom;

 advancing said catheter within the vasculature until the inflatable balloon is across the stenosis; and

20 inflating said balloon to cause at least one of said plurality of blade segments to move relative to the other said blade segments and to embed at least one of said plurality of blade segments into the stenosis and allow said external surface of said balloon to conform to the stenosis.

25 17. A method as recited in claim 16 further comprising the step of deflating said balloon to withdraw said blade segments from said stenosis.

18. A method as recited in claim 16 wherein said inflating step is performed to incise and dilate the stenosis.

19. A method as recited in claim 16 further comprising the step of removing said balloon and said blade segments from the patient.

5 20. A method as recited in claim 16 wherein each said blade segment is elongated defining a blade axis for each said blade segment, and each said blade segment is attached to said base member with its blade axis aligned substantially parallel to said balloon axis